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# *Cuphea fluviatilis* (Lythraceae), a New Species from Antioquia, Colombia

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**ABSTRACT.** *Cuphea fluviatilis* S. A. Graham, a new species of the Lythraceae from the margins of the Río Samaná in Antioquia Department, Colombia, is described and illustrated. The taxonomic relationships of the species are unsettled. The species bears flowers closely similar to those of species in section *Amazoniana* (Lourteig) Lourteig, but lacks the distinctive malpighiaceae trichomes characterizing the section; its pollen morphology, a significant indicator of broad relationships in *Cuphea*, is also unlike that of the section. Pollen of section *Amazoniana* is typically nonsyncolpate, without protruding pores, and with a psilate to finely rugulate exine; that of *C. fluviatilis* is syncolpate with protruding pores and a striate exine, a type common to numerous species currently classified in the polyphyletic sections *Brachyandra* Koehne and *Euandra* Koehne.

**Key words:** Colombia, *Cuphea*, IUCN Red List, Lythraceae.

In preparing an account of the Lythraceae for the *Catálogo de las Plantas Vasculares del Departamento de Antioquia, Colombia*, a joint project of the Missouri Botanical Garden and the University of Antioquia, an undescribed species of *Cuphea* P. Browne was discovered. *Cuphea* is the largest genus of the family with more than 260 species and is centered primarily in the eastern Brazilian highlands and secondarily in western and southern Mexico (Graham et al., 2006). The novelty described and illustrated here, *C. fluviatilis* S. A. Graham, appears at a superficial level to be a new member of section *Amazoniana* (Lourteig) Lourteig, but is not taxonomically assigned there. One of the 13 sections of the genus, section *Amazoniana* is atypical, being centered in northwestern South America and mainly occurring in riverine habitats in neighboring humid tropical regions of Venezuela, Colombia, and Brazil. The section is morphologically distinctive and easily recognized, and the species are closely similar, suggesting relatively recent radiation. *Cuphea fluviatilis* is found in Colombia along river margins in the humid tropical forest zone and displays a habit and leaf form common to the section. However, detailed examination including pollen morphology,

which has proven highly informative of relationships in *Cuphea* (Graham & Graham, 1971; Graham, 1998; Graham et al., 2006), raises questions about its sectional placement. An evaluation of possible relationships follows the description of the species.

***Cuphea fluviatilis* S. A. Graham, sp. nov.** TYPE: Colombia. Antioquia: Mun. San Luis, Río Samaná Norte, margen izquierda del río, sobre la via Medellín–Bogotá, 700–780 m, bht/bmht, 6°00'N, 74°50'O, 23 June 1987, R. Callejas, A. Arbelaez, H. Correa & J. Betancur 4108 (holotype, HUA not seen; isotypes, MO [2]). Figures 1, 2.

Haec species a congeneris quoad habitum similibus Americae australis partem boreali-occidentalem habitantibus caule setarum adscendentium incrassatarum seriebus duabus internodalibus ornato ceterum glabro, lamina foliari lineari glabra margine setis carnosae parce ciliata, tubo florali praeter setas nonnullas crassas secus costas glabro calcari brevi descendente praedito atque ovulis 4 ad 6 tantum perfacile distinguitur.

*Perennial* fruticose, multistemmed herbs to 40 cm tall; roots dense, fibrous; stems erect to semi-decumbent, much branched, branches ascending, 5–15 cm, invested by 2 opposing longitudinal rows of thickened, adpressed, ascending setae, the setae enlarged at the base, stems otherwise glabrous; internodes 1–3 mm, substantially shorter than the subtending leaves. *Leaves* decussate, sessile or subsessile; petioles absent or to 0.5 mm; blades linear, 10–30 × 0.3–1.2 mm, uninerved with midvein dark abaxially, thickly membranous, base attenuate, apex rounded, margin thickened or slightly inrolled, sparsely ciliated by well-separated adpressed setae; blade surfaces glabrous; leaves scarcely or not at all reduced in size toward the stem apex. *Inflorescences* leafy terminal racemes; flowers interpetiolar, alternate; pedicels 3–4.5 mm; bracteoles 0.5–0.7 × 0.3–0.5 mm, ovate to oblong, leaf-like, persistent at the apex of the pedicel. *Floral tubes* 5–6.5 × 1–1.2 mm at anthesis including a slightly descending spur 0.4–0.8 mm long, the mouth broadly flaring, 2–2.5 mm diam., blunt, neck not strongly contracted in fruit;



Figure 1. Isotype of *Cuphea fluviatilis* S. A. Graham (Callejas et al. 4108, MO). Inset at bottom: Close-up of flowers from isotype. Scale bar = 5 mm.

outer surface green, sparsely strigose on the ribs, the remainder glabrous; inner surface densely white villous ventrally in the mouth, the indument extending to the level of stamen insertion and along the 2 dorsalmost veins toward the base of the floral tube,

surface surrounding the ovary sparsely villous or pilose; calyx lobes deltate, ca.  $0.5 \times 0.5$  mm; epicalyx segments flattened lobes, reaching 1/2 the length of the calyx lobes, bearing a single seta at the apex; petals 6, oblong-spatulate, 2 dorsal ca.  $2.2 \times 0.7$  mm,

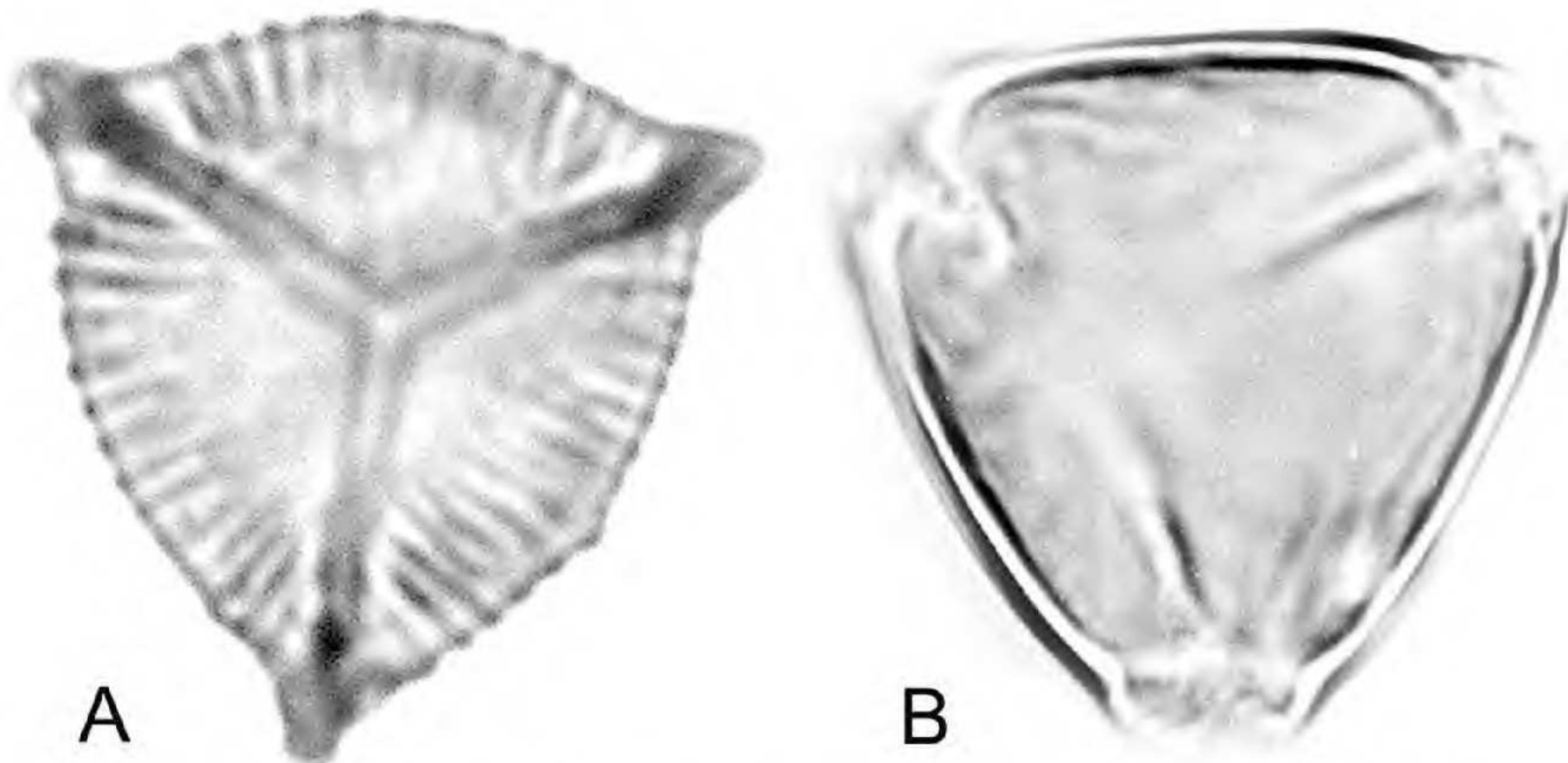


Figure 2. Pollen morphology. —A. *Cuphea fluviatilis*, non-acetolyzed, mounted in lactic acid, actual size 30  $\mu\text{m}$  in diam. —B. *Cuphea kubeorum* Lourteig, an exemplar of pollen from section *Amazoniana*, acetolyzed, mounted in glycerin jelly, actual size 25  $\mu\text{m}$  in diam.

4 ventral 2.8–3  $\times$  0.8–1.2 mm, white or pale pink; stamens 11, the 2 dorsalmost shortest, inserted slightly below the other 9, the others equally inserted, 3 ventral long stamens glabrous, the others villous, all included, anthers of the longest antesealous ones scarcely reaching the sinus of the calyx lobes; pollen oval-triangular in outline, tricolporate, syncolpate, pores protruding; exine uniformly striate, diam. 27–30  $\mu\text{m}$  in lactic acid; ovary pilose distally, nongibbous; style pilose at base, included, equal to longest stamens at anthesis, ultimately exerted; stigma small, capitate; ovules 4 to 6; nectariferous disc erect, perpendicular to the base of the ovary, thick, dark red, 0.6–1 mm wide in dorsal view. *Seeds* ca. 1.4  $\times$  1.5 mm, suborbicular, apex retuse, margin rounded.

*Distribution and phenology.* *Cuphea fluviatilis* is known only from the type area, at the margin of rivers at 500–780 m. It has been collected in flower and fruit in March and June and probably flowers throughout most of the year.

*IUCN Red List category.* Conservation status for *Cuphea fluviatilis* is Data Deficient (DD) according to IUCN Red List criteria (IUCN, 2001) because the species is known only from the type collection.

*Discussion.* This small linear-leaved shrub is uniquely differentiated from a number of *Cuphea* species with similar habit and habitat in northwestern South America by: two internodal rows of ascending, thickened setae on an otherwise glabrous stem; linear leaves with glabrous blades and a sparsely ciliate margin of fleshy setae; floral tubes glabrous except for a few coarse adpressed setae on the ribs and with a short descending spur; and ovules numbering only four to six (Fig. 1). Additionally, the pollen is

syncolpate with protruding pores and striate exine (Fig. 2A).

Within the genus, *Cuphea fluviatilis* agrees most closely with members of section *Amazoniana*. The section comprises 20 species with malpighiaceae trichomes, dorsal petals narrower than the ventral petals, and with distribution primarily along rivers in the western Amazon (Lourteig, 1986). The section (first published as a subsection) was drawn out of the South American section *Euandra* subsect. *Hyssopocuphea* Koehne p.p. (Lourteig, 1959) and subsequently expanded as new species were discovered in poorly explored parts of Amazonian Venezuela and Colombia (Lourteig, 1986, 1996). Flower morphology of *C. fluviatilis* is characteristic of section *Amazoniana*, i.e., the floral interior villous; nectariferous disc thick, short, and erect; ovary and style base pilose; and seeds less than 2 mm long. Unlike other members of the section, however, *C. fluviatilis* does not bear the conspicuous malpighiaceae trichomes that are a major diagnostic character of the section, and the pollen does not correspond to that of the section. The pollen of all members of section *Amazoniana* lacks protruding pores, is psilate or finely rugulate, and generally is nonsyncolpate (Fig. 2B).

Pollen morphology has been of great value in recognizing relationships in *Cuphea* that are obscured by floral homoplasy. Although some pollen features are also homoplastic, related plant species can share virtually identical pollen and some sections or clades are recognizable based on pollen morphology (Graham & Graham, 1971; Graham, 1998; Graham et al., 2006). The syncolpate striate pollen type of *C. fluviatilis* is a widespread form that appears in several phylogenetic lineages whose species have been

classified in either sections *Brachyandra* Koehne or *Euandra* Koehne (Koehne, 1903, but also see Graham, 1998: fig. 3a, section *Brachyandra*/*C. pseudosilene* Grisebach; Graham & Graham, 1971: fig. 14, section *Euandra* subsect. *Platypterus* Koehne/*C. corisperma* Koehne and fig. 17, *C. carunculata* Koehne).

The type collection of *Cuphea fluviatilis* was originally determined as aff. *C. hyssopifolia* Kunth (sect. *Euandra* subsect. *Hyssopocuphea*), another linear-leaved fruticose member of the genus that is found along river margins in humid tropical areas, especially in Central America. That species is superficially similar to *C. fluviatilis* in its habit, small flowers with ovate bracteoles, and seeds less than 2 mm long. The flowers differ in being a spurless, slender tube and the pollen is nonsyncolpate with nonprotruding pores and a psilate exine as in section *Amazoniana*. At present, without independent molecular evidence, the relationships of *C. fluviatilis* are unclear. It shares floral morphology, but not plant indument or pollen type with members of section *Amazoniana* and in other respects displays features held in common by numerous members of the large polyphyletic sections *Brachyandra* and *Euandra* without apparent close relationship to any particular species.

*Paratype.* COLOMBIA. **Antioquia:** Mun. San Luis, margen del Río Samaná, Vereda el Portón, camino a la autopista Medellín–Bogotá, 5°57'N, 74°57'W, 4 Mar. 1990, D. Cardenas L., J. G. Ramirez & J. Mejia 2507 (JAUM not seen, MO).

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